Claims

1. A passive cooling system for removing heat from a component located within a passenger compartment of a vehicle, the vehicle having an external portion, the passive cooling system comprising:

a heat pipe within the component, the heat pipe communicating between the component and the external portion of the vehicle, the heat pipe containing a liquid, the heat pipe having an evaporator section located within the component and a condenser section located at the external portion of the vehicle such that when a temperature at the evaporator section is greater than a temperature at the condenser section, heat passively transferred from the component to the external portion of the vehicle.

2. The passive cooling system of claim 1 wherein the component is an instrument panel.

3. The passive cooling system of claim 2 wherein the instrument panel has an outer layer composed of a thermoplastic polymer and wherein the evaporator section of the heat pipe is thermally connected to the thermoplastic layer.

4. The passive cooling system of claim 3 further comprising a plurality of heat pipes.

5. The passive cooling system of claim 3 wherein the thermoplastic polymer is polyvinyl chloride.

6. The passive cooling system of claim 3 further comprising a thermally conductive film wherein the evaporator section of the heat pipe is thermally connected to the thermally conductive film and the thermally conductive film is embedded in the thermoplastic layer of the instrument panel.

7. The passive cooling system of claim 6 wherein the heat pipe is attached to the thermally conductive film and the film is adhered to the thermoplastic layer of the instrument panel.

8. The passive cooling system of claim 6 wherein the thermally conductive film is a metal selected from the group consisting of copper, molybdenum, gold, nickel, stainless steel, niobium, cobalt, chromium, beryllium, magnesium, platinum, iridium, bronze, silver, tin, titanium, iron, tungsten, zinc and tantalum.

9. The passive cooling system of claim 6 wherein the thermally conductive film is a ceramic material selected from the group consisting of silicon carbide, alumina and aluminum nitride.

10. The passive cooling system of claim 6 wherein the thermally conductive fulm is a carbon-based material selected from the group consisting of a carbon-fiber composite, carbon foam material and diamond.

11. The passive cooling system of claim 7 further comprising a bracket for accepting the heat pipe wherein the bracket is attached to the thermally conductive film.

12. A passive cooling system for an instrument panel in a vehicle, the passive cooling system comprising:

a heat pipe having an evaporator section in communication with a condenser section, the evaporator section embedded in the instrument panel; and

an external portion of the vehicle at a temperature lower than the temperature of the instrument panel, wherein solar heat absorbed at the instrument panel is transferred to the evaporator section of the heat pipe, onto the condenser section of the heat pipe and dissipated to the external portion of the vehicle.

13. The passive cooling system of claim 12 wherein the instrument panel has an outer layer composed of a thermoplastic polymer and wherein the heat pipe is embedded in or adjacent to the outer thermoplastic polymer layer.

14. The passive cooling system of claim 13 further comprising a thermally conductive film wherein the evaporator section of the heat pipe is thermally connected to the film and the film is embedded in the thermal plastic polymer layer of the instrument panel.

15. The passive cooling system of claim 14 further comprising a bracket attached to the thermally conductive film for accepting the heat pipe, wherein the thermally conductive film is adhered to the thermoplastic polymer layer of the instrument panel.

16. The passive cooling system of claim 15 further comprising a thermally conductive grease for coating the heat pipe, wherein the thermally conductive grease facilitates the transfer of heat from the bracket to the heat pipe.

17. The passive cooling system of claim 12 wherein the external portion of the vehicle is a side body panel.

18. The passive cooling system of claim 12 wherein the external portion of the vehicle is a roof.

19. The passive cooling system of claim 12 wherein the heat pipe is further defined as comprising copper and as containing water suitable for transferring the solar heat absorbed at the instrument panel to the external portion of the vehicle.

20. The passive cooling system of claim 12 wherein the heat pipe is further defined as comprising a closable valve for substantially thermally disconnecting the evaporator section of the heat pipe from the condenser section of the heat pipe, wherein solar heat absorbed at the instrument panel is trapped in the evaporator section of the heat pipe when the valve is in a closed position.

21. The passive cooling system of claim 20 wherein the valve is triggered to close at a preset instrument panel temperature.

22. The passive cooling system of claim 20 further comprising a passenger compartment within the vehicle, wherein the valve is triggered to close at a preset air temperature within the passenger compartment.

23. The passive cooling system of claim 20 wherein the valve is triggered to close by a manual switch.

24. The passive cooling system of claim 12 wherein the instrument panel has an inner layer composed of polyurethane and wherein the heat pipe is embedded in or adjacent to the inner polyurethane layer.

25. The passive cooling system of claim 12 wherein the instrument panel has an inner layer composed of a thermoplastic polymer and wherein the heat pipe is embedded in or adjacent to the inner thermoplastic polymer layer.

26. A method for passively controlling the temperature of an instrument panel in a vehicle, the method comprising:

obtaining a heat pipe having an evaporator section in communication with a condenser section;

embedding the evaporator section of the heat pipe in the instrument panel; and

securing the condenser section of the heat pipe to an external portion of the vehicle.

27. The method of claim 26 wherein the instrument panel has an outer layer composed of a thermoplastic polymer and the embedding of the evaporator section of the heat pipe in the instrument panel further comprises: connecting the evaporator section of the heat pipe to a thermally conductive film and adhering the film to the thermoplastic polymer layer of the instrument panel.

28. A cooling system for an instrument panel in a vehicle, the passive cooling system comprising:

an external portion of the vehicle at a lower temperature than the instrument panel; and

a means for passively removing heat from the instrument panel to the external portion of the vehicle.

29. The cooling system of claim 28 wherein the means for passively removing heat from the instrument panel to the external portion of the vehicle is at least one heat pipe.